

Retrospective and Prospective Study of Modified Asopa-I Repair in Hypospadias Patients

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Abstract

Context: There is no data published on the outcome and complications of Modified Asopa-I repair, though it is conceptually proved to be superior and results are better. Hence study on this subject was necessary. **Aims:** To evaluate the results of Modified Asopa-I repair in patients of hypospadias. **Settings and design:** A retrospective and prospective, Analytical study was carried out at Asopa Hospital and Research Centre, Agra. **Methods and Material:** 56 patients operated by Modified Asopa-I repair procedure for hypospadias between April 2012 to March 2016 at Asopa Hospital and Research Centre, Agra were included. Surgery for hypospadias is done after the patient is 18 to 24 months of age and onwards but preferably before age of school going. **Statistical Analysis:** Proportions were used to analyze the data. **Results:** 23 (41.07%) patients developed one or more complications. Majority of which were minor complications. Early post-operative complications, like suture line infection and edema developed in 21.42% patients each. 3.57% patients had flap necrosis. 7.14% patients developed urethrocutaneous fistula. On follow-up for 1 month to 4 years, residual chordee, meatal stenosis & stricture urethra was not detected in any patient. Diverticulum, sacculation and 'S' shape deformity was also not detected in any case. 3 (5.35%) patients required second surgery. **Conclusion:** The Modified Asopa-I repair can be done in patients of hypospadias with chordee & urethral opening from glandular to pen scrotal region,

with adequate prepuce, and flat, concave or conical glands.

Keywords: Modified Asopa-I Repair; Hypospadias; Complications; Follow up.

Introduction

Hypospadias, a congenital defect is defined as an abnormal urethral opening situated proximal to its normal site on the ventral aspect of penis anywhere between the tip of the glans and the perineum. This may or may not be associated with other local defects, like chordee (skin and dartos, short fibrosed spongiosa or corporal disproportion) and abnormal distribution of skin. This abnormality is present in approximately 1 in 300 male newborns [1].

The main objective of surgery is to construct a straight penis with meatus as close to the normal site as possible and to allow a forward directed stream of urine and normal coitus [2].

Deiffenbach (1836) [3] was credited with the first attempt to correct hypospadias, which was unsuccessful. The first successful repair was described by Angerin 1874 [6]. Since then more than 300 procedures for the surgical repair of this anomaly are mentioned in various literature available, but till date there is no consensus among the hypospadiologists worldwide on the best procedure for the primary repair. Hypospadias can be repaired in one, two or multiple stages depending upon presence or absence of chordee, site of meatus and presence of local tissue, prepuce or penile skin for repair and previous history of surgery.

There are two ways for single stage repairs in hypospadias, urethral plate salvage and tubularised flaps and grafts. Use of dorsal prepuce for urethral

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reconstruction in hypospadias was first described by Asopa, Hodgson and further popularized by Duckett [4,5,6].

Tubularised grafts and free grafts fail apparently because they are prone to circumferential contraction [7].

The use of skin flaps is justified by the presence of rich intrinsic blood supply and in case of prepuccial skin, an easily isolated vascular pedicle [8]. So, prepuccial skin and adjacent penile shaft have been considered and shown to provide reliable substitution tissue in a variety of repairs either tubularised (Asopa, Hodgson, Duckett, Koyangietc) or onlay (Mathieu) [9]. The addition of a subcutaneous or tunica vaginalis flap to cover the urethroplasty has been shown to improve ultimate outcome of urethral reconstruction and reduce complications [10].

The urethral plate salvage techniques appears to be conceptually superior to tubularised repairs because a secure scaffold is created that is spread fixed open anchoring the subsequent penile flap onlay in an open, U-shaped configuration [7].

Long term complications of single stage flap repair repairs are:

- i. Diverticulum formation, sacculation, 'S' shape deformity of urethra (probably because of neourethra is not fixed to the underlying tunica) [15].
- ii. Urethrocutaneous fistula
- iii. Stricture urethra

To overcome this problem of lack of fixity in tubularised repairs, a new technique has been introduced since 2010, that is Modified Asopa-I repair, in which neourethral edges are fixed to underneath tunica albugenia to provide wider fixity of neourethra, other advantages of this procedure , inherent to single stage surgery are :

- a. To avoid second surgery
- b. Economy
- c. To avoid psychological trauma of multiple surgeries to the patient and his family members
- d. Decreased morbidity

There is availability of published literature about previous tubularised techniques such as Asopa-I repair, Hodgson repair, Duckett repair, Mathieu procedure but there is no data published on the outcome and complications of Modified Asopa-I repair, though it is conceptually proved to be superior and results are better. Hence study on this subject was necessary.

This study would like to evaluate the results of MODIFIED ASOPA-I REPAIR in patients of hypospadias.

Material and Methods

Study Site

Asopa Hospital and Research Centre, Agra .

Study Population

All the patients operated by Modified Asopa-I repair procedure for hypospadias between April 2012 to March 2016 at Asopa Hospital and Research Centre, Agra.

Study Design

A retrospective and prospective, Analytical study.

Inclusion Criteria

All the patients who underwent Modified Asopa-I repair from April 2012 to March 2016 at Asopa Hospital and Research Center, Agra.

Exclusion Criteria

Any patient who did not give consent to be part of the study

Sample Size

During 1st April 2012 to 30th march 2016, 3050 patients were operated for various problems at Asopa Hospital and Research Centre, Agra. Of them, 1252 patients were operated for hypospadias. During the study period, 56 patients of hypospadias were operated by Modified Asopa-I repair.

The prevalence of modified Asopa-I repair in hypospadias patients among the total operated cases was 2% (56 out of 3050 subjects).

Methodology

Over a period of time it is noticed that vascularized pedicle tube repairs and two stage repairs have problems like, diverticula formation or saculation and 'S' deformity, which was never been observed in cases of onlay patch repair. To overcome this problem a new technique is developed, Modified Asopa-I repair.

Surgical Protocol

Time for Surgery

At Asopa Hospital & research Centre, Agra, surgery for hypospadias is done after the patient is 18 to 24 months of age and onwards but preferably before age of school going.

Pre-Operative

Patients were advised to be nil by mouth 4 to 6 hours before surgery.

Intra-Operative

Position of Patient

Supine or lithotomy position as per the site of urethral opening and hospital protocol

Anaesthesia

Spinal, Caudal or General Anesthesia according to age and general condition of patient

Suture Material

Sutures like 5/0 or 6/0 chromic catgut on reverse cutting needle are used for urethroplasty.

Haemostasis

To obtain bloodless field, epinephrine 1:800000 in 2% lignocaine or sometimes tourniquet may be applied for a short time. Fine & precise cautery may be used for haemostasis.

Procedure

1. Circumcoronal, racquet shaped incision incorporating urethral meatus.
2. Degloving
3. Assessment of chordee by Gittes method of artificial erection on the table [21]
4. Chordee correction is performed by excision of all fibrous tissue meticulously
5. Glans wings are raised when glans is grooved or tunneling of glans is done in conical glans
6. Inner prepuccial flap based on superficial dorsal penile vessels marked in triangular fashion and trimmed from outer prepuccial skin by sharp meticulous dissection
7. An oblique cut at junction of right 2/3rd and left 1/3rd is made on circumferential penile skin without injuring blood supply
8. Now after harvesting inner prepuccial flap, the cranial margin of flap is dissected off from the pedicle for 2-3 mm (this partially devascularised margin acts as a free graft).
9. Caudal margins of flap are anastomosed to proximal urethra & anchored to the penile shaft up to tip of laid opened glans eccentrically.
10. Partially devascularised cranial margins (which act as a free graft) are sutured to the tunica, leaving gap of 2 mm, to tubularise the neo urethra.

11. An additional row of continuous sutures are given over the surrounding avascular plane of dartos, folded sutured caudal margins incorporating tunica. This procedure gives wide area of attachment of neo-urethra to the tunica, also the partially devascularised taken up well.

This additional procedure prevents sacculation as well as diverticula formation & ensures long term patency as well as good result.

11. Skin cover with eccentric suture line.

Postoperative Dressing & Catheterization

A circular mild compressing dressing is applied postoperatively. Check dressing done after 48 hours. Regular dressings were usually done on post op days 2, 7, 12 and 14 or as per condition of dressing. Loose fitted sialistic or portex catheter (6 fr to 10 fr according to size of urethra) left for 12-14 days.

Method of Measurement of Outcome of Interest:

Every patient who underwent Modified Asopa-I repair was included and examined daily keeping note on any day to day problems post operatively. Regular dressings were done on approximately post op day 2, 7, 12 and 14 keeping note of findings after every dressing. On post-operative day 14 or on evidence of good healing, whichever is later, we usually remove catheter and site of passage of urine after catheter removal is noted. We are keeping follow up after 1 month and 6 month up to four years for any complications.

Cases operated from October 2014 onwards, data is maintained by taking brief history and examination. Regular follow up is done in out-patient department at 1 month and later every 6 month interval.

Cases operated between April 2012 to September 2014, data is taken from hospital records, clinical notes of surgeon regarding condition of dressings for early complications and condition after catheter removal. Follow up is done in out-patient department. On follow up, history of patient is taken thoroughly regarding any late complications, like urethro-cutaneous fistula, stricture urethra, diverticulum, sacculation, residual chordee. Urine flow rate is measured and stream of urine, caliber of meatus is checked. MCU & RGU was done at 6 months of follow up.

Results

This study was undertaken to evaluate the result of Modified Asopa-I repair in patients of hypospadias at Asopa Hospital and Research center, Agra.

A total number of 1252 patients underwent hypospadias repair during April 2012 to march 2016

at Asopa Hospital and Research Centre, Agra. 56 of them were operated by modified Asopa-I repair. These 56 patients were included in this study.

Table 1 shows distribution of procedures carried out at Asopa Hospital. On the basis of presentation of cases, we selected cases for particular procedure. Two stage repairs were done in 476 (38.19%) patients, T.I.P. in 154 (12.30%) patients. Prepuccial onlay patch repair was done in 287 (22.92%) cases. Modified Asopa-I repair was performed in 56 (4.47%) cases during the study period at our hospital.

Table 2 shows case distribution of modified Asopa-i repair. Out of 56 patients studied, 51 (91.07%) patients were new cases (not operated previously) and remaining 05 (8.93%) were referred for failed

hypospadias (operated earlier but had intact prepuce at presentation)

Table 3 shows age incidence of patients undergoing Asopa I repair. According to age incidence of 56 patients included in this study, maximum patients 23 (41.07%) presented to us before 5 years of age. 2 patients (3.57%) were more than 25 years of age at the time of presentation. The age ranged from 2 years to 32 years and median of 9 years.

Table 4 shows presentation of patient at the time of admission. Of the 56 patients studied, all had chordee and maximum 15 (26.78%) had mid penile meatus. 13 (23.21%) and 12 (21.42%) had proximal penile and distal penile meatus respectively. 6 (10.71%) had Penoscrotal meatus.

Table 1: Distribution of procedures carried out at Asopa Hospital

Type of procedure	Total no. of cases	percentage
M.A.G.P.I.	55	4.39%
T.I.P.	154	12.30%
Onlay Patch	287	22.92%
Dorsal Free Graft	37	2.95%
Asopa-I Repair	11	0.8%
Two Stage Repair	476	38.19%
Fistula Closure with Local FLAP	176	14.05%
Modified Asopa-I Repair	56	4.47%

Table 2: Case distribution of modified Asopa-i repair

Total no. of cases operated by Modified Asopa-I repair (April 2012 to March 2016)	Total no. of fresh cases	Total no. of previously operated cases with intact prepuce
56	51 (91.07%)	5 (8.93%)

Table 3: Age incidence of patients undergoing Asopa I repair

Age group (years)	No. of patients underwent modified Asopa-I repair (from Apr 12 to Mar 16)	Percentage (%)
<5	23	41.07%
5-10	15	26.78%
10-15	07	12.5%
15-20	03	5.35%
20-25	06	10.71%
>25	02	3.57%

Table 4: Presentation of patient at the time of admission

Type of hypospadias	Number	Percentage (%)
Coronal& Sub coronal	10	17.85%
Distal penile	12	21.42%
Mid penile	15	26.78%
Proximal penile	13	23.21%
Peno-scrotal	06	10.71%
	56	100%

Table 5: Complications encountered in immediate post- operative period

Complications	Total no. of patients (Percentage)	Managed by	Outcome	
			Improved	Failed (developed fistula)
Bleeding & hematoma	2 (3.57%)	Evacuation and compressive dressing	2	0
Edema	12 (21.42%)	Conservatively	11	1
Flap necrosis	2 (3.57%)	Conservatively	2	0
Suture line infection	12 (21.42%)	Change in antibiotics	09	3

Table 6: Complications encountered in follow-up (delayed complications)

Complication	Follow up		Total
	1 month	6 months	
Urethro-cutaneous fistula	4	3	3
Meatal stenosis	Nil	Nil	Nil
Diverticulum	Nil	Nil	Nil
Sacculation	Nil	Nil	Nil
'S' shape deformity	Nil	Nil	Nil
Stricture urethra	Nil	Nil	Nil
Residual chordee	Nil	Nil	Nil

Table 5 shows complications encountered in immediate post- operative period. Of the 56 patients operated by Modified Asopa-I repair, 23 (41.07%) patients had complications during hospital stay. 16 patients developed single complication and 7 had more than one complication. Suture-line infection was noticed in 12 patients. These were managed by change in antibiotics. Out of these 12 patients, 9 were improved and remaining 3 failed in the form of urethro-cutaneous fistula later. Edema was noticed in 12 patients and these were managed conservatively. Of these 11 patients improved on conservatively and 1 developed urethro-cutaneous fistula later. Bleeding & hematoma was reported in 2 patients post-operatively. Both improved by evacuation and compressive dressings. Minor flap necrosis was noticed in 2 patients post-operatively. Both improved by conservative management. Thus, in this study total 4 patients had urethro-cutaneous fistula on removal of catheter. These patients had been advised to keep finger over fistula site while urinating. Of these 4 patients, fistula closed spontaneously in 1 patient and remaining 3 undergone fistula closure surgery 6-12 months later.

Table 6 shows complications encountered in follow-up (delayed complications). Of the 56 patients, 15 patients, operated during October 2014 to March 2016, were seen in follow-up after 1 and 6 month of catheter removal, 41 patients operated during April 2012 to September 2014 were contacted over the phone and requested to come for follow-up. Out of 4 (7.14%) patients who had urethro-cutaneous fistula on removal of catheter, in 1 patient had fistula closed spontaneously. Remaining 3 were advised second surgery. So, in this study failure rate of Modified Asopa-I repair was 3 from 56 patients (5.35%). No patient in follow-up had

meatal stenosis, diverticulum, sacculation, 'S' shape deformity, stricture urethra or residual chordee till the end of study period.

Discussion

Present study was conducted during April 2012 to March 2016 at Asopa Hospital and Research Centre, Agra. During the study period, 1252 patients of hypospadias underwent different procedures for hypospadias. Of them, 56 patients were selected for Modified Asopa-I repair, which were included in the study.

Out of 56 patients studied most of our patients 51 (91.07%) were fresh cases (not operated previously) and 5 (8.93%) patient were selected with history of previous surgery having intact prepuce. Castanon M, et al. [11] included 42 patients operated by tubularised island flap, all new cases.

In this study of 56 patients, age ranged from 2 years to 32 years with mean of 8.64 years and median of 5 years. Maximum number of patients 23 (41.07%) were up to 5 years of age. The overall age at presentation was higher than in other reported series as patients reported late and also at Asopa Hospital and research center, Agra, we prefer to operate for hypospadias after the age of 2 years. Elbakry A, et al. [12] included 74 patients with mean age 7 years, range 2-19 years. Powell CR, et al. [13] included 142 patients with median age of 11.3 months.

In this study, maximum patients 15 (26.78%) had urethral opening in midpenile region. 13 (23.21%) had urethral opening in proximal penile region. 12 (21.42%) patients had distal penile meatus. 10 patients

had meatus in coronal & subcoronal region. 6 (10.71%) had Penoscrotal meatus. Elbakry A, et al. [12] had 14 distal-penile, 41 mid-penile & 19 penoscrotal meatus at presentation, all had chordee. Singhal AK, et al. [14] studied 92 cases of TPOIF of which 38 had proximal penile, 30 penoscrotal & 24 scrotal / perineal meatus at presentation. Castanon M, et al. [11] had 2 glanular, 6 distal-penile, 23 mid-penile & 11 scrotal hypospadias patients.

Of the 56 patients operated by Modified Asopa-I repair; majority of patients had minor complications. Edema developed in 12 (21.42%) patients which was subsided on conservative management. suture line infection was noticed in 12 (21.42%) patients, for which antibiotics were changed. Flap necrosis developed in 2 (3.57%) patients, which was managed conservatively. 2 (3.57%) patients had post-operative bleeding & hematoma which was managed by evacuation and compressive dressings. Urethro-cutaneous fistula was detected in 4 patients on removal of catheter. Of these 4 patients, fistula closed spontaneously in 1 patient, remaining 3 undergone fistula closure surgery 6 months later.

On follow-up (range 1 month to 4 years), out of 4 (7.14%) patients who had urethro-cutaneous fistula on removal of catheter, in 1 patient fistula closed spontaneously (patient had been advised to keep finger over fistula site while urinating). Remaining 3 were advised second surgery. So failure rate was 3 from 56 patients (5.35%) in this study.

No patient in follow-up for 6 months to 4 years had meatal stenosis, diverticulum, sacculation, 'S' shape deformity, stricture urethra or residual chordee.

Early complications in this study were similar to other reported studies on hypospadias; but late complications like diverticulum, sacculation, 'S' shape deformity, meatal stenosis, residual chordee & stricture urethra were significantly low in this study.

Tubularization of inner prepuccial island flap may induce ischemic changes that result in variable degree of flap necrosis and fistula formation [15]. In this study, minor flap necrosis was detected in 2 of 56 patients (3.57%), which is mostly due to ischemic necrosis, infection and/or hematoma formation that may occlude the small vessels supplying the neourethra. It is similar to reports of Castanon M et al. [15] who detected skin necrosis in 4.7% patients. Elbakry A [12], reported flap necrosis in 7% & Barraza et al. [16] reported flap necrosis of tubularised inner prepuccial flap in 6% patients.

Of the 56 patients included in this study, none had diverticulum, sacculation & 'S' shape deformity in the follow-up. It is probably due to wide area of attachment & fixity of neourethra to the tunica albuginea. Though, further follow-up is needed, as these complications often develop late. These results are far better than other reported series. Elbakry A [12], reported diverticula

in 4% of patients operated by transverse prepuccial island flap-tube repair. Singhal AK, et al. [14] reported diverticula in 2.17% patients.

Out of 56 patients studied, none had residual chordee in follow-up. This can be attributed to method of chordee correction used & experience of surgeon. We had done orthoplasty by excision of urethral plate and underlying fibrous tissue by sharp dissection. Some authors had done tunica albuginea plication for orthoplasty. Results of this study are similar to Castanon M, et al. [11] series of transverse prepuccial island flap-tube repair who reported no residual chordee in 38 patients of tubularised island flap repair. Weiner JS, et al. [15] reported 3% of recurrent chordee operated by tubularised island flaps for hypospadias.

No patient in this study developed complication of meatal stenosis. Weiner JS, et al. [15] had reported meatal stenosis in 4% cases & Singhal AK, et al. [14] reported it in 5.43% cases.

Stricture urethra is one of the most significant complications of hypospadias surgery. In this study, no patient had detectable stricture urethra till the end of study period. Further follow-up is needed. Elbakry A [12] reported 9% cases & Castanon M, et al. [11] reported 7.1% cases of stricture urethra in tubularised island flap repair.

Average duration of post-op catheterization in patients operated by Modified Asopa-I repair in this study was 14.92 days (14±1 days) i.e. around 15 days. It is similar to other reported series on hypospadias. Elbakry A [12] kept stent for 12 days. Singhal AK, et al. [14] catheterized patients for 10 days. Average duration of catheterization of 12±2 days was reported by Asopa HS, et al. [17].

From 23 patients who developed complications, 6 patients were undergone re suturing. Of these 6 patients, 5 patients (83.33%) improved and 1 patient failed in the form of urethro-cutaneous fistula.

Once a fistula develops, one should wait for at least 6 months for inflammation and induration to resolve [18]. Though this statement is true for two-stage repairs when the skin suture line is in midline overlying the neourethra.

As we have used flap in this study, we have been re suturing the skin flap in a moderate sized fistula detected during a change of dressing, between the 7th and 12th post-operative day.

The scrotal flap is raised along with dartos and advanced. Devitalized margins of skin flaps are excised and skin cover is achieved. There was rapid and satisfactory healing in 5 of 6 cases (83.33%) in this study. Asopa et al. [17] reported success in 21 of 26 (80.76%) cases of hypospadias which undergone early re suturing.

There are some limitations of the present study. Though we documented cosmetic and functional outcomes by physical examination and ascertaining a good stream of urine over 6 months –4 years of follow-up, we did not perform any uroflowmetry studies. Nonetheless, the current study has a significant sample size of 56 patients and validates that good outcomes are possible in hypospadias patients using the Modified Asopa-I repair.

Conclusion

The Modified Asopa-I repair can be done in patients of hypospadias with chordee & urethral opening from glanular to peno-scrotal region, with adequate prepuce, and flat, concave or conical glans.

Key messages

Considering these results in compared to similar studies, and low rate of post-surgical late complications, Modified Asopa-I repair is suggested for the similar hypospadias correction.

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